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Route To:

Subject: Evaluation of True Mistletoe (*Phoradendron* spp.) in the Oak Resources on the Manzanita Indian Reservation (FPM Report No. S97-3)

To: Superintendent, Bureau of Indian Affairs, Southern California Agency

In response to a request by Frances Shaw, Chairperson, Manzanita Band of Mission Indians, to evaluate what the tribe described as heavy infestationss of true mistletoe in the oak resources on the reservation, James Allison, So. Ca. Service Area Pathologist, accompanied by Gil Stuart, BIA Forester, and Lee Shaw-Conway, Sec./Treasurer of the Manzanita Band of Mission Indians, evaluated the severity of the mistletoe in the oaks.

We evaluated the oaks in nine areas of the reservation which lies in the Live Oak Springs Quad. Area 1: Live oaks ranged from 8"--44" dbh and were very heavily infected with TM and exhibited dieback; Area 2 (Angela'): Live oaks ranged from 10" to 40" dbh and were heavily infected with mistletoe and exhibited some crown dieback; Area 3 (Jerry's Water): Live oaks ranged from 3" to 60" dbh with the larger trees heavily infected with mistletoe; Area 4 (Cottonwood): This was the riparian area with two cottonwoods (20" and 30" dbh), one willow (30" dbh), and one live oak (60" dbh) and all were moderately to heavily infected with mistletoe; Area 5 (BIA Maintenance Yard): Two live oaks, both 25" dbh, were heavily infected with mistletoe; Area 6 (Tecate Divide): The 150 live oaks in this area ranged from 2" to 25" dbh and were heavily infected with mistletoe; Area 7 (Community House): The approximately 50 live oaks in this area ranged from 10"-60" dbh and were heavily infected with mistletoe; Area 8 (Nick Elliott): The two oaks (30" and 40" dbh) in this area were heavily infected with mistletoe; and Area 9 (Horse Camp): The group of live oaks in this area were 12" to 40" dbh and were heavily infected with mistletoe.

Value

Live oaks are the most important tree species on the Reservation. Oaks have always been an important component of Native American Culture. Oak acorns were an important staple of this culture. At the present time, oaks have value as wildlife shelter and food, shade for cattle, and provide shade and aesthetics in recreation areas.

Biology

True mistletoes (*Phoradendron* spp.) are evergreen, parasitic flowering plants that appear as conspicuous balls of foliage in the crown of trees. They reduce the vigor and can threaten the survival of shade and forest trees. True mistletoes are large woody plants with mature shoots more than six inches long and one-eighth inch or more in diameter. Their foliage may be leafy or scaly. The true mistletoes on oaks and other hardwoods have leafy foliage. Their fruit is a round berry, with seeds which are disseminated by birds-including robins, bluebirds, thrushes, and cedar waxwings. Birds digest the pulp of the berries and excrete the living seeds, often depositing them onto susceptible trees. A viscous coating and hair-like thread on the outer surface of the seeds attach them to twigs and branches, where they germinate and infest the host tissues.

Young or small trees are seldom infected by leafy mistletoe. In nearly all cases, initial infection occurs on larger or older trees because birds prefer to perch in their tops. Severe buildup of mistletoe often occurs in an already-infected tree because birds are attracted to and may spend prolonged periods feeding on the mistletoe berries.

True mistletoes are usually considered to be curiosities, but they can be serious pests where individual trees are of high value such as in yards, parks, and campgrounds. Trees heavily infected by true mistletoe are weakened, reduced in growth rate, and sometimes killed. Weakened trees are sometimes predisposed to attack by insects and often die during drought or other periods of stress. Branches heavily-laden with mistletoe often break during storms or high winds, and trunk swellings may provide an entrance point for decay fungi, further increasing the hazard to people and property in campgrounds and other developed areas.

Discussion

True mistletoe is the most prevalent pest in the oak resource on the Manzanita Indian Reservation. Live oaks and hardwood species which are infected with mistletoe as well as showing signs of dieback and heartrot are under stress. The slow decline in the vigor of these trees would be accelerated during periods of drought. Removing the mistletoe stress is possible and would benefit the oaks and other hardwood species and prevent the intensification of infections within and between crowns. Below is a discussion of possible treatments for true mistletoe.

I. Eliminate Infection

Remove all mistletoe from oaks and other hardwood species in the nine areas and from an area large enough to reduce the threat of reintroduction of the parasite from nearby infested trees. Because of long-range spread by birds, it is not possible to eradicate the mistletoe completely. However, since true mistletoes often take five to ten years to develop to damaging proportion, re-treatment will not be necessary for several years. Temporary elimination of the mistletoe can be accomplished as follows:

- A. Prune. Where possible, prune infected limbs one foot or more below the point of mistletoe attachment, preferably at the bole or at the nearest crotch. Retreatment in 2 to 3 years is necessary to remove new plants that sprouted from latent infections.
- B. Remove Trees. Cut host trees in and around high-use recreation areas that are severely infected and cannot be pruned. Small- to moderate-size oaks may be cut as close to the ground as possible and allowed to sprout. The sprouts should then be managed.

II. Reduce Mistletoe Intensity

If the value of the oaks cover dicates that few or no trees should be cut, you may choose to remove only the most severely infested and most hazardous trees, and treat the remainder to reduce the effect of the parasite without eliminating it. The goal of this alternative is to prolong the lives of individual trees by preventing severe buildup of the parasite. A combination of any or all of the alternatives mentioned above- including whole tree removal and pruning -may be applied.

Another alternative for reducing mistletoe intensity is to remove mistletoe shoots. Removing the aerial shoots of the mistletoe plant does not kill the mistletoe system within the plant, so the parasite will grow back in about three to five years. Breaking off the shoots will reduce moisture stress, improve overall tree growth and vigor, and inhibit local spread by preventing seed production.

By not attempting to eliminate the mistletoe, the manager agrees to live with the parasite and to accept some growth loss and reduction in vigor. Inspections should be made every 3 to 5 years to determine mistletoe spread and intensification, and to plan for possible re-treatment.

If you have any questions concerning this evaluation, contact me at 909-884-6634 Ext. 3123.

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cc: Frances Shaw, Chairperson, Manzanita Band of Mission Indians
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